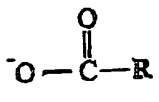
Amended Patent claims

(amendments not marked)

1. A process for the oxidation of unsaturated hydrocarbons, wherein an unsaturated hydrocarbon, an oxygen-containing oxidizing agent, a palladium complex as the catalyst containing a ligand of the formula (I)



(I)

wherein R is a saturated, halogenated alkyl radical having 1 to 20 C atoms, wherein the palladium complex contains, in addition to the ligand of the formula (I), an organic ligand (X∩Y) which contains at least two atoms X and Y of main group III, V or VI of the periodic table, wherein this ligand can be coordinated to palladium via at least one of these two atoms X and Y and wherein at least one of these atoms is a constituent of a heterocyclic, aromatic ring system, and optionally auxiliary substances are brought into contact with one another

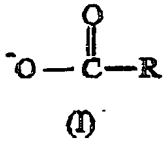
in a liquid phase based on

(α1) 10 to 100 wt.% of a protic polar solvent and

(α2) 0 to 90 wt.% of an aprotic polar solvent, the sum of components (α1) and (α2) being 100 wt.%,

at a temperature in a range from 30 to 300°C under a pressure in a range from 1 to 200 bar, such that a liquid phase containing oxygen-containing hydrocarbons is obtained.

2. A process for the oxidation of unsaturated hydrocarbons, wherein an unsaturated hydrocarbon, an oxygen-containing oxidizing agent, a palladium complex as the catalyst containing a ligand of the formula (I)



(I)

wherein R is a saturated, halogenated alkyl radical having 1 to 20 C atoms, and optionally auxiliary substances are brought into contact with one another

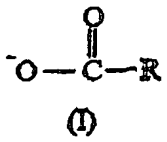
in a liquid phase based on

(α1) 40 to 90 wt.% of a protic polar solvent and

(α2) 10 to 60 wt.% of an aprotic polar solvent selected from the group consisting of polyethylene glycol dialkyl ethers, polyethylene glycol divinyl ethers or polyethylene glycol vinyl alkyl ethers, the sum of components (α1) and (α2) being 100 wt.%,

at a temperature in a range from 30 to 300°C under a pressure in a range from 1 to 200 bar, such that a liquid phase containing oxygen-containing hydrocarbons is obtained.

3. A process for the oxidation of unsaturated hydrocarbons, wherein an unsaturated hydrocarbon, an oxygen-containing oxidizing agent, a palladium complex as the catalyst containing a ligand of the formula (I)



(I)

wherein R is a saturated, halogenated alkyl radical having 1 to 20 C atoms, and optionally auxiliary substances are brought into contact with one another

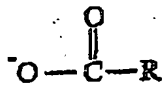
in a liquid phase based on

(α1) a protic polar solvent and

(α2) an aprotic polar solvent, the weight ratio of the protic to the aprotic solvent being in a range from 100,000 : 1 to 1 : 10,

at a temperature in a range from 30 to 300°C under a pressure in a range from 1 to 200 bar, such that a liquid phase containing oxygen-containing hydrocarbons is obtained, the protic polar solvent not being water and the aprotic polar solvent not being diglyme.

4. A process for the oxidation of unsaturated hydrocarbons, wherein an unsaturated hydrocarbon, an oxygen-containing oxidizing agent, a palladium complex as the catalyst containing a ligand of the formula (I)



(I)

wherein R is a saturated, halogenated alkyl radical having 1 to 20 C atoms, and optionally auxiliary substances are brought into contact with one another

in a liquid phase based on

(α1) water and

(α2) diglyme, the weight ratio of the water to the diglyme being in a range from 100,000 : 1 to 1 : 10,

at a temperature in a range from 30 to 300°C under a pressure in a range from 1 to 200 bar, such that a liquid phase containing oxygen-containing hydrocarbons is obtained.

5. Process according to one of the preceding claims, wherein the radical R is a trifluoromethyl radical.

6. Process according to one of the preceding claims, wherein the oxygen-containing oxidizing agent is chosen from the group consisting of O_2, H_2O_2 and N_2O.

7. Process according to one of the preceding claims, wherein the liquid phase is a mixture of water and diglyme.

8. Process according to one of the preceding claims, wherein the unsaturated hydrocarbon is propylene.

9. Process according to one of the preceding claims, wherein the palladium complex is first activated by reduction before it catalyses the oxidation of the unsaturated hydrocarbon.

10. Process according to one of claims 2 to 9, wherein the palladium complex contains, in addition to the ligand of the formula (I), an organic ligand (X∩Y) which contains at least two atoms X and Y of main group III, V or VI of the periodic table, wherein this ligand can be coordinated to palladium via at least one of these two atoms X and Y and wherein at least one of these atoms is a constituent of a heterocyclic, aromatic ring system.

11. Process according to claim 1 or 10, wherein the organic ligand (X∩Y) can be coordinated to palladium as a bidentate ligand via the two atoms X and Y.

12. Process according to claim 1 or 11, wherein the organic ligand (X∩Y) is p-bathophen-sulfonate or 2,2'-bipyridyl.

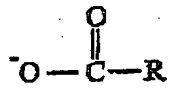
13. Process according to one of claims 1 to 12, wherein acetic acid or a salt of acetic acid is employed as the auxiliary substance.

14. Use of acetic acid or of a salt of acetic acid as an auxiliary substance in a process according to one of claims 1 to 13

(δ1) to increase the catalytic useful value of the palladium complex in the oxidation of unsaturated hydrocarbons, or

(δ2) to increase the selectivity of the oxidation of unsaturated hydrocarbons.

15. A process for the preparation of water-soluble or water-absorbent polymers, wherein, in a liquid phase obtained by a process for the oxidation of propylene, wherein propylene, an oxygen-containing oxidizing agent, a palladium complex as the catalyst containing a ligand of the formula (I)



(I)

wherein R is a saturated, halogenated alkyl radical having 1 to 20 C atoms,

and optionally auxiliaries are brought into contact with one another in a liquid phase based on

(α1) 10 to 100 wt.% of a protic polar solvent and

(α2) 0 to 90 wt.% of an aprotic polar solvent, the sum of components (α1) and (α2) being 100 wt.%,

at a temperature in a range from 30 to 300°C under a pressure in a range from 1 to 200 bar, or by a process according to one of claims 1 to 8, the acrylic acid contained as the oxygen-containing hydrocarbon is polymerized and the water-soluble or water-absorbent polymer obtained in this way is then optionally dried and comminuted.